

# **LAUNCH AND LANDING**

**STS-103**  
**FLIGHT READINESS REVIEW**

**November 19, 1999**

**Ground Operations**

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<b>AGENDA</b>	

➡ ● Integrated Operations

J. Vevera

● Shuttle Engineering

R. Millang  
T. Herst

● NASA Managed Activities

S. Altemus

● Summary

E. Adamek  
D. King

## PROCESSING DIFFERENCES

**Presenter:****J. Vevera****Organization/Date:****Ground Ops/11-19-99**

- Processing Differences - VAB / Pad
  - Planned
    - CRT #2 Remove and Replace
    - Wire Repair Retest
  - Unplanned
    - Engine 3 Remove and Replace
    - Wire Repair
      - SRB Range Safety Cross-Strap Cable remove and replace
      - Orbiter wire inspection and repair (heightened awareness)
      - Begin Aft closeout inspections earlier than normal
      - Monoball Wire Harness Inspections

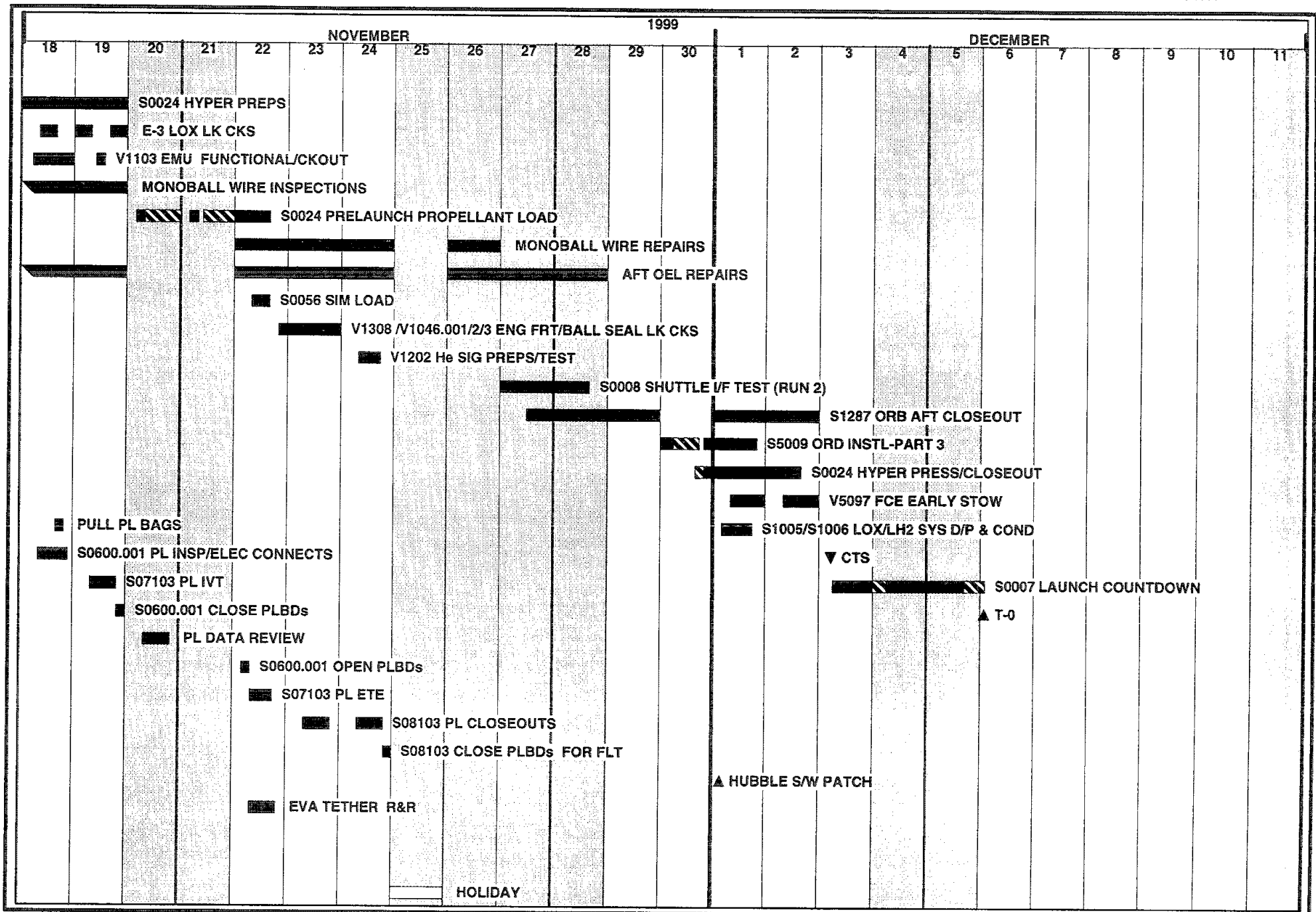
# STS-103 / OV-103

## Operations Summary

OPR: SPC - D. Thompson, INTEG (1-2565)  
NASA - P. Phillips, PZ-F (1-9105)

19NOV99

06:17



<b>AGENDA</b>	

- |                           |                        |
|---------------------------|------------------------|
| ● Integrated Operations   | J. Vevera              |
| ➡ ● Shuttle Engineering   | R. Millang<br>T. Herst |
| ● NASA Managed Activities | S. Altemus             |
| ● Summary                 | E. Adamek<br>D. King   |

**OMRS STATUS****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- RCNs in Review
  - Mandatory Flight Element RCNs None
  - Mandatory GSE RCNs None
  - Open Waiver / Exceptions in Review None
- Open Time / Life Cycle
  - Actions to be performed before Launch None
  - Hardware items that will expire between Launch and Launch plus 30 days None

# GROUND LAUNCH SEQUENCER

**Presenter:**

**Rich Millang**

**Organization/Date:**

**Ground Ops/11-19-99**

## Ground Launch Sequencer Configuration for STS-103

- GLSDD (KLO-82-0071A) Rev 7, Change S, September 1999
- Incorporated Change

**SSID /  
OMRS**

**Description and Remarks**

APU-  
08,11,12,16

GLS was updated with adjusted APU limits

SSME-04

GLS was modified Limit Change to AFV Temp. limit

K89340

Deleted logic from the term LOX replenish sequence

- Mask
  - Standard Mask Items are in Back-up
- Limit Change/Bypass - None



## UNEXPLAINED ANOMALIES

**Presenter:**

**Rich Millang**

**Organization/Date:**

**Ground Ops/11-19-99**

- Deferred - 1
  - \* ● PR-UA-3-0150: ROMS Vapor Iso Valve Indicated Open  
When Commanded Close (LV-506)
- Closed - 1
  - \* ● PR-UA-3-0151: LRCS He Iso Valve B Indicated Open  
When Commanded Close (LV-201)
- No Open UAs

\* Presented at STS-103 Orbiter Rollout Milestone Review and are in Back-up

**ENGINEERING TOPIC****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: LOX Pump Controls and Mounting Base Plates Upgraded
- Discussion
  - LOX Pumps Variable Frequency Drivers (VFDs), which controls and monitors the LOX pumps during ET loading, were replaced with a new state of the art Allen Bradley VFD
    - The new VFDs use highly reliable/repeatable Pulse Width Modulation Technology for pump control
    - Capability to increase pump RPM to the higher flow rates (3450 RPM), resulting in less time for fast fill (Approx. 18 min)
    - The new VFDs will provide additional remote monitoring and troubleshooting capabilities
    - The new VFDs will not change the loading procedure and process
  - The project also included modification to the LOX Pump Bases
    - New base plates and foundation to reduce the vibration

**ENGINEERING TOPIC****Presenter:**  
**Rich Millang****Organization/Date:**  
**Ground Ops/11-19-99**

- Title: LOX Pump Controls and Mounting Base Plates Upgraded
- Discussion (Cont'd)
  - LOX pumps validation was successful
    - Cold flow run completed with no anomalies
    - All parameters were verified successfully
- Risk Assessment
  - Lower supportability risk because of new/improved hardware
    - Reduce the likelihood for Red Crew access
- Summary
  - The LOX Pumps are ready to support Tanking for S0007

**ENGINEERING TOPIC****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

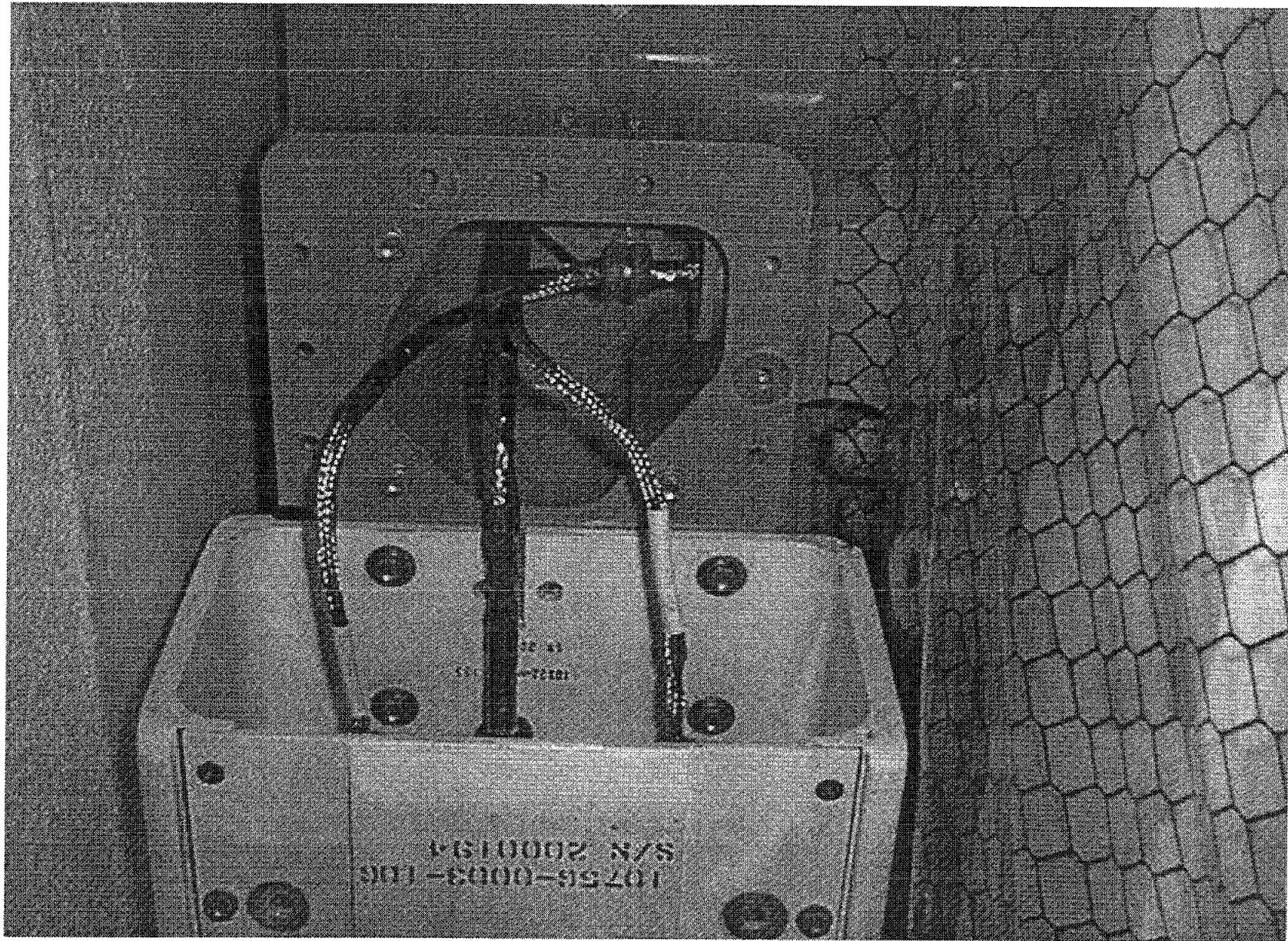
- Title: ET/SRB Cross Strap Cable Failure
- Observation
  - During the Range Safety Test the Left-Hand System A Arm command did not arm Right-Hand System B
  - This is the first time the RSS System is checked out in a closeout for flight configuration. This task has always been a constraint to rollout to the pad
- Concerns
  - Loss of Range Safety System Redundancy

**ENGINEERING TOPIC****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: ET/SRB Cross Strap Cable Failure
- Actions Taken
  - The remained of the RSS testing was completed successfully
  - Troubleshooting was performed to isolate the problem
    - Continuity/Isolation test was done on the LH A to RH B cable
      - Short identified in the Left/Right Hand crossover cable, and return line
    - During Right-Hand Fairing Cover removal, crushed cable identified between fairing cover, fwd attach point sealing surfaces
  - The replacement cable was retested in the VAB
    - Procedure was changed to restrained cables using Kapton Tape and Tie Cord to eliminate cable pinching

**ENGINEERING TOPIC****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: ET/SRB Cross Strap Cable Failure
- Open Actions
  - Evaluation of other areas was done and no additional inspections were required
- Risk Assessment
  - No change, the system has been returned to drawing configuration
- Summary
  - The RSS has been returned to drawing configuration and all OMRSD testing done
  - RSS is ready to support STS-103



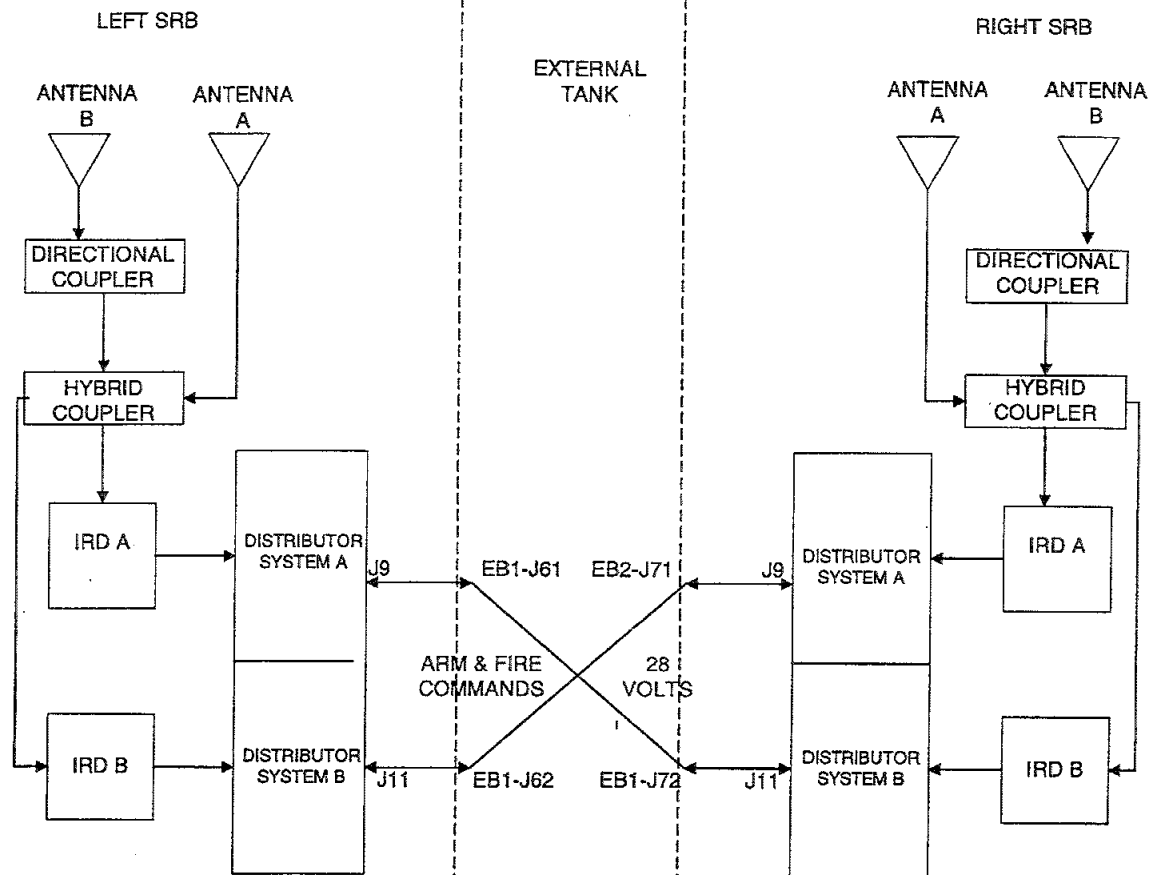
GO-14





GO-15





GO-16

**ENGINEERING TOPIC****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: Absent TCS Buttons
- Observation
  - During the final cleaning of the Payload Bay at Pad B, 3 missing TCS Tie Down buttons were documented (Ref PR-LAF-0580 and PR-LAF-0581)
    - One Button off external A/L in Bay 3
    - Two Buttons off 1307 Bulkhead
- Concerns
  - Possible damage to Payload Hardware during Flight Operations
    - Area of concern was the HST Electrical Umbilical during mating operation

**ENGINEERING TOPIC****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: Absent TCS Buttons
  
- Actions Taken
  - Inspection of the Payload Bay was conducted during the Final Payload Bay Highly Sensitive Cleaning Operation (3 shifts)
    - No Buttons were found
  - Replaced the TCS Buttons
  - Closeout Photo from the OPF were reviewed
    - OPF Photos showed that the buttons were not installed

**ENGINEERING TOPIC****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: Absent TCS Buttons
- Actions Taken (Cont'd)
  - After OPF Closeout Photos were taken Payload Bay Final OPF cleaning occurred
    - Forward Bulkhead, Bays 1-2, and external Airlock cleaned to Highly Sensitive
    - Bays 3-13 and Aft Bulkhead cleaned to standard
  - Additional Inspection of the 1307 Bulkhead area will be done prior to final door closure
- Risk Assessment
  - Risk low, a thorough search of the Payload Bay area was done and no buttons were found
  - System Engineering evaluation will be done to verify no adverse effect on the Flight Requirements

**ENGINEERING TOPIC****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: Absent TCS Buttons
- Summary
  - After final inspection and evaluation this PR is no longer a constraint to flight

**ENGINEERING TOPIC****Presenter:****Terri Herst****Organization/Date:****Launch & Landing/11-19-99**

- Title: Post STS-93 LCC Action Items
  1. Identify all dynamic parameters monitored after LCC expires and the monitor criteria
  2. Present a summary of the new LCC for hazardous gas monitoring



**ENGINEERING TOPIC****Presenter:****Terri Herst****Organization/Date:****Launch & Landing/11-19-99**

- Title: Post STS-93 LCC Action Items
- 1. All dynamic parameters during terminal countdown reviewed
  - Two dynamic events identified as a potential manual hold after T-31 seconds from confirmed unsafe situation
    - Hazardous Gas Monitoring for LH2 leak in the aft
    - GLS Monitoring Degradation of the integration and backup consoles performance
  - Any events with a potential manual hold after T-31 seconds are based on multiple system indicators and are considered extremely remote



**ENGINEERING TOPIC****Presenter:****Terri Herst****Organization/Date:****Launch & Landing/11-19-99**

- Title: Post STS-93 LCC Action Items
  - Reaffirms no change in LCC philosophy or implementation since return to flight
    - Unexpected LCC exceeded outside the time period effectivity does not constitute an LCC violation but will be reported until T-31 seconds
    - All voting Logic Anomalies will be reported prior to T-31 seconds
    - All non LCC Flight and Ground Systems failures (including all element OMRSD) will be reported prior to T-5 minutes
      - OMRS after T-5 minutes will be managed by the GLS
  - Any manual cutoff calls after T-31 seconds will be in support of a confirmed safety critical condition





**ENGINEERING TOPIC****Presenter:****Terri Herst****Organization/Date:****Launch & Landing/11-19-99**

- Title: Post STS-93 LCC Action Items
- Summary
  - KSC Launch Team is trained to follow the LCC and OMRS Guidelines
  - These Guidelines will be briefed to the KSC Launch Team every launch through Pre-test Briefings



**ENGINEERING TOPIC****Presenter:****Terri Herst****Organization/Date:****Launch & Landing/11-19-99**

- Title: Post STS-93 LCC Action Items
2. The PSIG and Hazardous Gas Communities have spent the last 3 months reviewing the Hazardous Gas Launch Commit Criteria and the analysis behind these LCCs. Present a Summary of the LCC changes for Hazardous Gas Monitoring (SSID HAZ-03)
- The LCC limits have remained the same from T-6 hours to T-1:46 minutes (LH2 pre-press)
  - The LCC limit has been changed from 300 ppm to 240 ppm and from T-1:46 minutes to T-31 seconds
    - Limit changed to reflect transport times of the HGDS
    - If the limit is exceeded during this time frame, the count will hold at T-31 seconds. The leak rate will be evaluated with respect to the Maximum Aft Leakage Transient Analysis Curve



**ENGINEERING TOPIC****Presenter:****Terri Herst****Organization/Date:****Launch & Landing/11-19-99**

- Title: Post STS-93 LCC Action Items
  - Using the Prime, Backup, or HUMS HGDS a launch hold recommendation will be made after data confirmation
    - Confirmation of a leak is defined as two successive indications on a single system or corroborating data from multiple systems
    - If suspect indications occur within the LCC time frame that prohibits confirmation before reaching T-31 seconds, a hold recommendation will be made
      - Allows time at T-31 seconds to confirm if the indication is an instrumentation failure or hazardous gas leakage



**ENGINEERING TOPIC****Presenter:****Terri Herst****Organization/Date:****Launch & Landing/11-19-99**

- Title: Post STS-93 LCC Action Items
  - Hazgas LCC terminates at T-31 seconds
  - Hazgas launch countdown hold call after T-31 seconds
    - Hazgas is receiving good aft concentration data beyond T-31 seconds and will continue to evaluate
    - Manual safety critical call for confirmed concentrations significantly out-of-family or for unsafe leaks
    - Leaks will be confirmed
    - Manual calls will not be made after T-10 seconds



<b>AGENDA</b>	

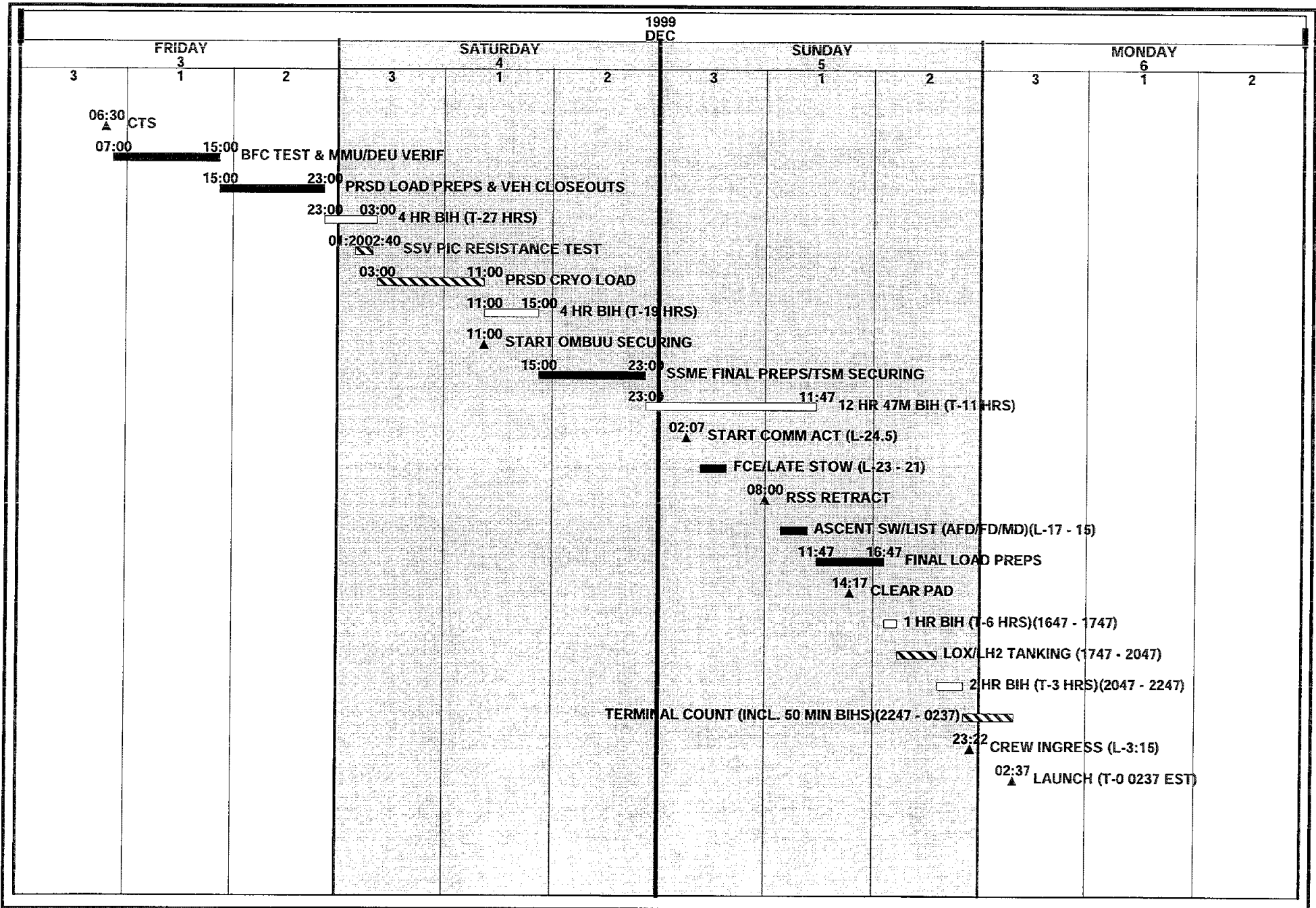
- |                             |                        |
|-----------------------------|------------------------|
| ● Integrated Operations     | J. Vevera              |
| ● Shuttle Engineering       | R. Millang<br>T. Herst |
| ➡ ● NASA Managed Activities | S. Altemus             |
| ● Summary                   | E. Adamek<br>D. King   |

# STS-103 / OV-103

## Launch Countdown Summary

OPF: S. Altemus (1-9302)

09NOV99 15:25



**NOTE:**

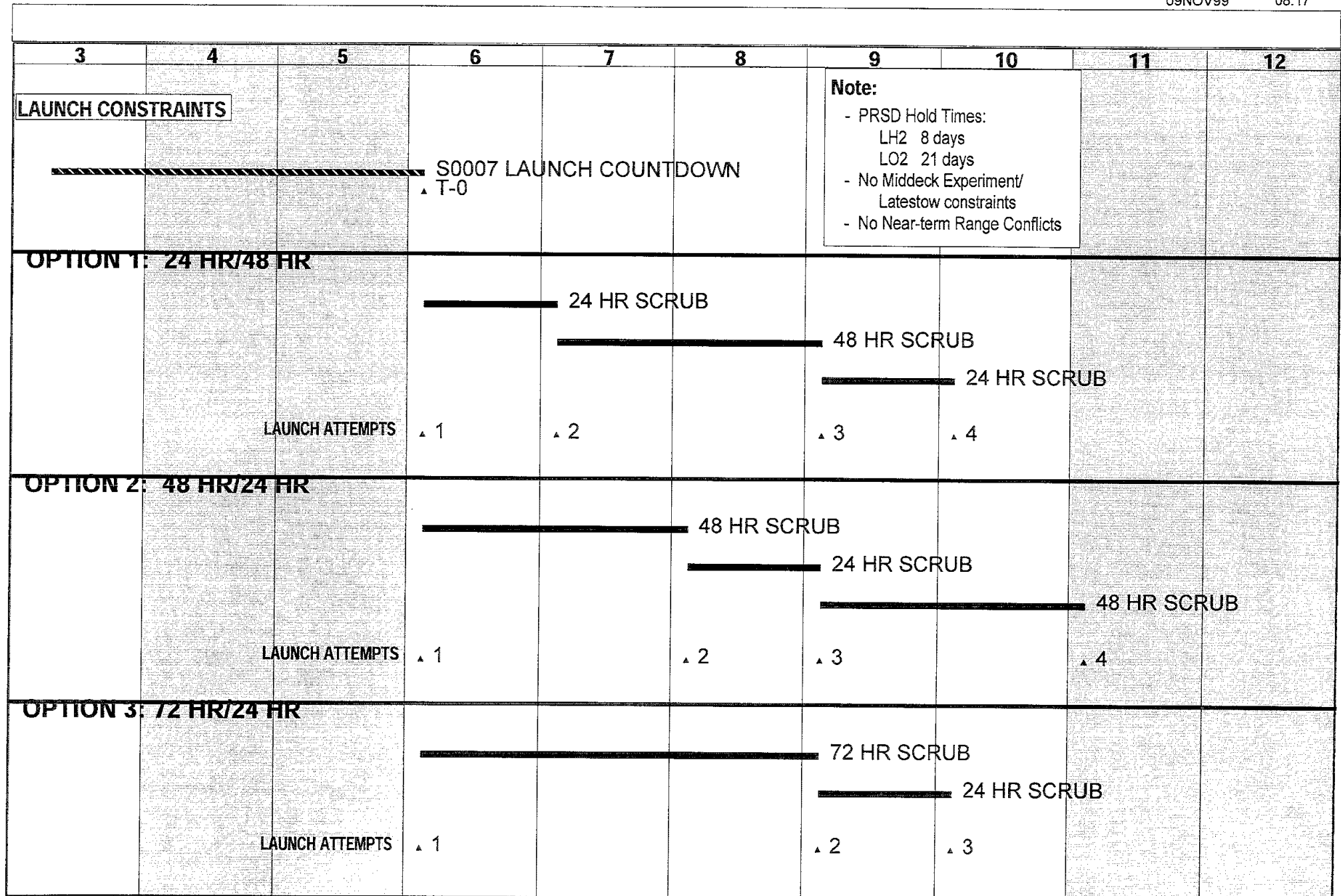
Actual scrub turnaround timelines will be determined  
realtime based on specific conditions encountered.

# STS-103

## LAUNCH COUNTDOWN TURNAROUND OPTIONS

OPR: S. ALTEMUS 1-9302

09NOV99 08:17



# LANDING OPERATIONS STATUS

**Presenter:**

**Steve Altemus**

**Organization/Date:**

**Launch & Landing/11-19-99**

- **TAL Site Status**
  - Prime: Banjul Deploys at L-11 days, November 26, 1999
  - Alternates:
    - Ben Guerir Deploys at L-10 days, November 27, 1999
- **AOA Status**
  - Prime: DFRC Deploys at L-2 days, Mini Convoy
  - Alternates:
    - KSC Full Convoy
    - WSSH Deploys at L-2 days, Mini Convoy
- **Mission Support**
  - DFRC/EDW Mini Convoy
  - KSC Mini Convoy
  - WSSH Mini Convoy
- **EOM Support**
  - Prime: KSC Full Convoy
  - Alternates:
    - DFRC/EDW Full Convoy
      - Holiday Turnaround/Ferry plans are in place
    - WSSH Mini convoy





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# **LAF-3-27-0582**

## **Missing 1/4" Ratchet**

**Presenter**

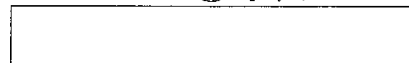
**Jim Wilder**

**Date**

**11-19-99**

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31A



- **Issue:**

- During the end of shift inventory on 11-17-99, a 1/4 inch Ratchet was observed missing from a tool box located in the Pad B PCR
- Ratchet has not been located as of 12:00 EST 11-19-99
- Concern the ratchet may be in the Orbiter Payload Bay

- **Background:**

- Tool Control Process
  - Tool Boxes are locked and the key controlled by the First Line Manager or Lead.
  - Inventory of Tool Boxes that are used is conducted before and after each task.
    - Shadow Boxed
  - Tools are “logged out/in” by the technicians as they are removed/returned.
  - Periodic (no more than 6 months) full audit by serial number conducted.

- **Background (cont.)**

- On 11-17-99, the HST III Payload Electrical Connections scheduled.
- Ratchet detected missing during Post Task Inventory
- Log had no indication Ratchet was removed/used from this box.
  - A 1/4" Ratchet was needed for electrical connection, but was used from a different box with full accountability.
- All other tools accounted for through the log and inventory
- Key was inadvertently left in tool box for a short duration.

- **Actions Taken:**

- Conducted an extensive search of all PCR work platforms and all accessible areas of Payload Bay, particularly electrical connect area.
  - Access and Orbiter configuration remained the same as when electrical connection was worked.
  - Nothing Found

- **Actions Taken (cont.)**

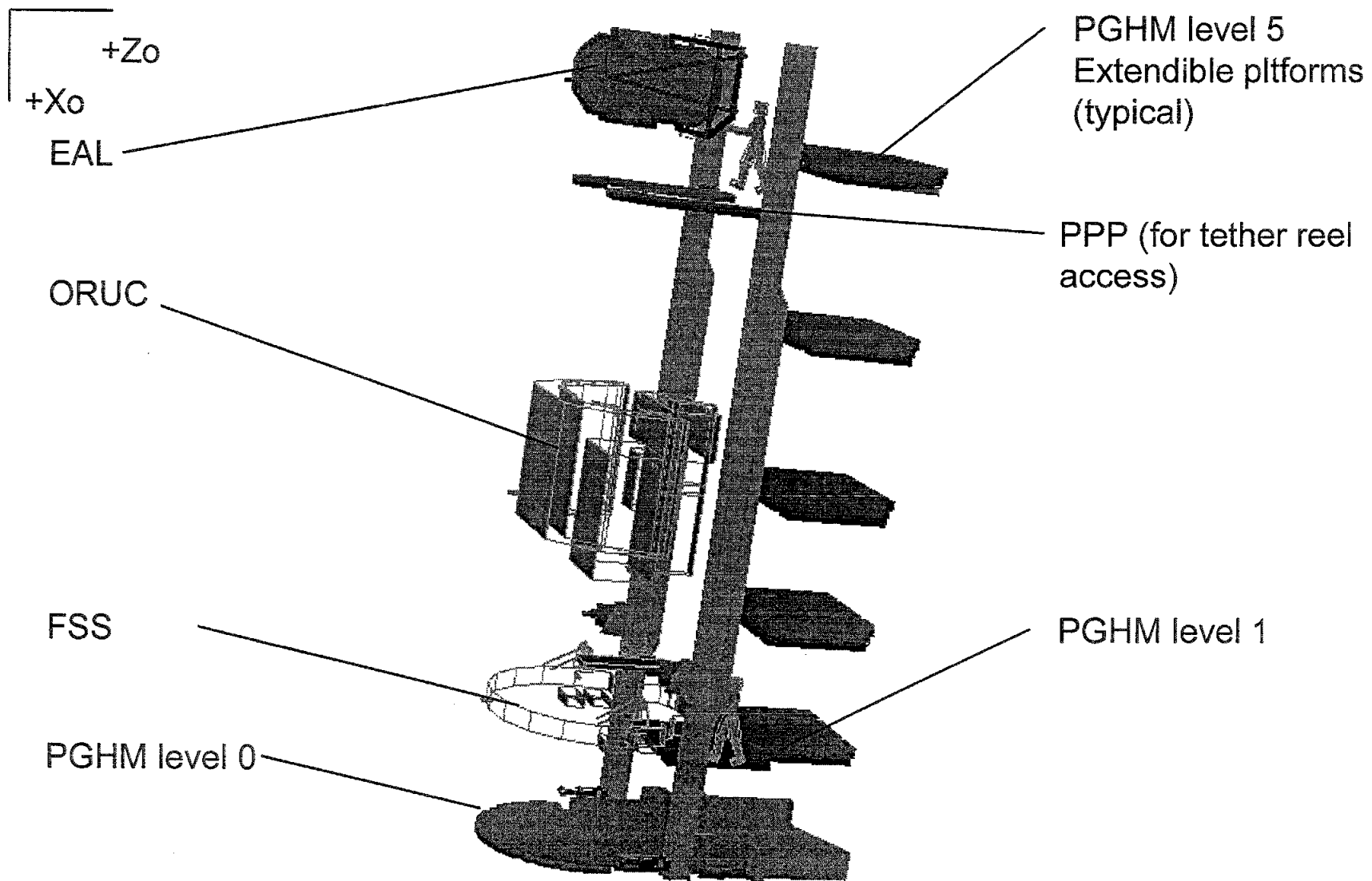
- Interviewed all technicians involved with the Payload Transfer Activity
  - No one recalls seeing/needing an additional 1/4" Ratchet.
- Reviewed PCR Personnel Access List.
  - Contacting everyone who entered the room.
  - ECD COB 11-23-99 (HST Personnell have returned home).
- 100% Tool Audit conducted on both Pads (serial number verified).

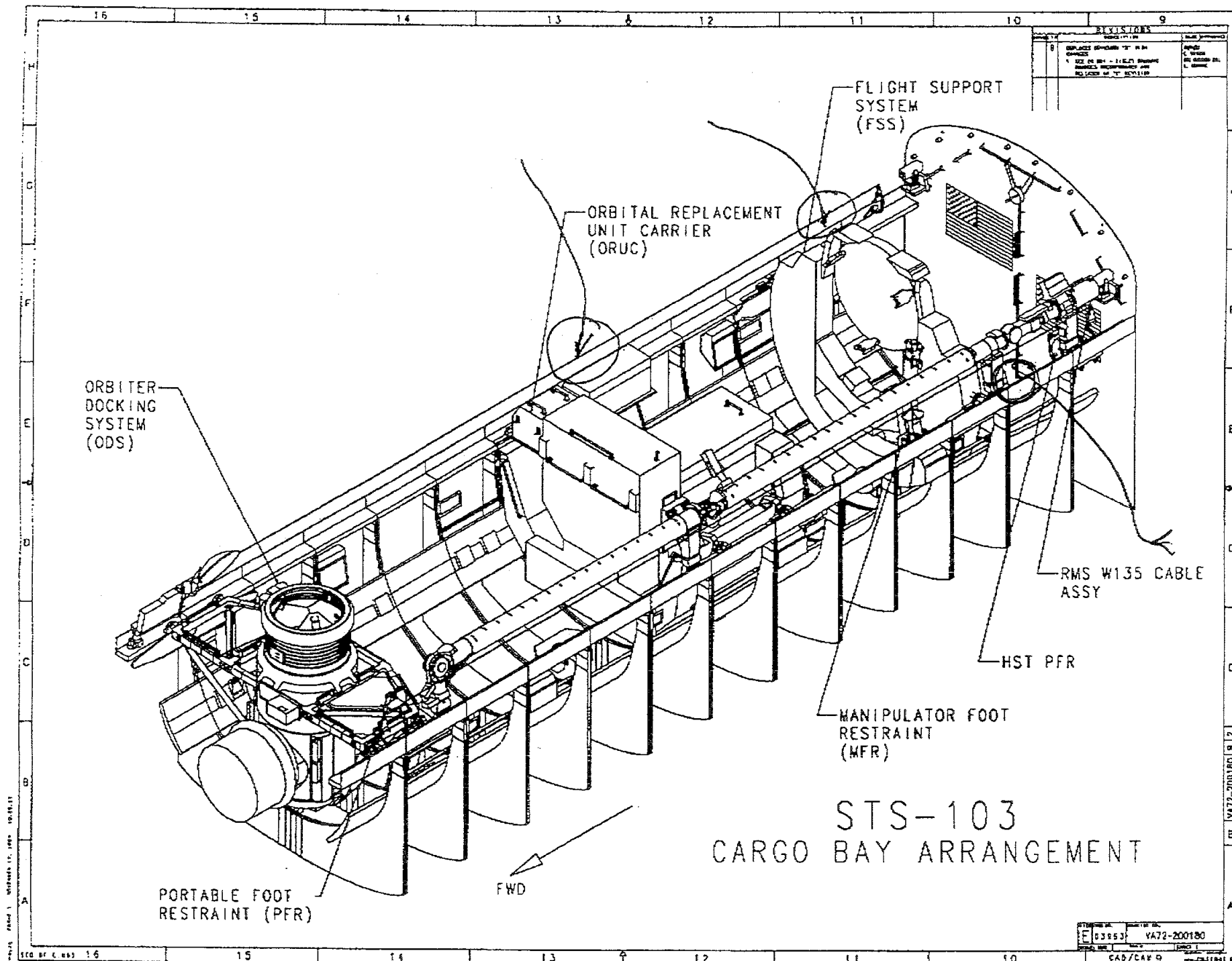
- **Risk Assessment**

- Likelihood tool left in vehicle low. (1)
  - Tool Control Process is Sound
    - Inventories before and after each task
    - Weekly Audits
    - Sign out logs kept up to date
    - Tethering rules strictly enforced
  - Areas worked in thoroughly inspected.
  - Verified all WADS worked that day for wrench requirements
  - Inspected all areas where tool could fall and come to rest.
    - Platforms, Orbiter and Payload
    - No Liner/TCS Blanket damage detected
- Consequences high (Failure to meet mission objectives) (4)
- Total Risk 4 (Green)

# STS- 103 (HST SM3) General Vertical Access

November 1999





<b>AGENDA</b>	

- |                           |                        |
|---------------------------|------------------------|
| ● Integrated Operations   | J. Vevera              |
| ● Shuttle Engineering     | R. Millang<br>T. Herst |
| ● NASA Managed Activities | S. Altemus             |
| ➡ ● Summary               | E. Adamek<br>D. King   |



## GROUND OPERATIONS STATUS

**Presenter:**  
**Ed Adamek**

**Organization/Date:**  
**Ground Ops/11-19-99**

- The following Ground Operations Organizations and processes were evaluated for STS-103 Launch

- Safety & Mission Assurance
- Site Readiness
- Vehicle and GSE Modification Status
- Critical Process Changes
- Support Requirements (PRD/KPRD)
- Open Systems Work and Schedules
- Configuration Management
- Software, SCAN & TOPS Status
- Inflight Anomaly Status
- RCNs
- OMRSD Satisfaction
- Launch Team Training

**No Issues for STS-103**

**READINESS STATEMENT****Presenter:****Ed Adamek****Organization/Date:****Ground Ops/11-19-99**

Subject to completion of planned work and identified constraints, USA Ground Operations is ready to proceed with Launch Operations

## LAUNCH AND LANDING SUMMARY

**Presenter:****Dave King****Organization/Date:****Launch & Landing/11-19-99**

- STS-103 Readiness Statement
  - No significant deviations from planned surveillance activities
  - Observations indicate stable and capable core processes
  - Reviews of NASA managed activities and out-of-family issues completed
  - Launch Team training goals and objectives accomplished
  - Planning for Launch Countdown, Landing and Recovery on schedule



# Kennedy Space Center Shuttle Processing & Supporting Organizations

## STS-103

This is to certify that appropriate CoFR items from NSTS 08117, Appendix H and I, Flight Preparation Process Plan, have been reviewed and dispositioned. Subject to completion of planned work and resolution of any identified constraints, KSC Shuttle Processing and Supporting Organizations are ready to support Launch Operations.

  
Charles W. Murphy  
APM, Integrated Logistics, USA

  
E. J. Beckett  
Director, Program Planning & Verification, USA

  
John Weaver  
Director, Ground Support Systems, USA


  
Mark Nappi  
Director, Shuttle Engineering, USA

  
Jimmy Rudolph  
Director, Safety & Mission Assurance, USA

  
Robert S. Herman  
Director & Chief Engineer, USA

  
Kenneth J. Payne  
Director of Logistics Operations, NASA

  
Conrad G. Nagel, Acting  
Director, Process Integration, NASA

  
Charles A. Abner  
Chief Engineer, NASA

  
J. Chris Fairey  
Director of Safety & Mission Assurance, NASA

  
David A. King, Acting  
Launch Director, NASA

  
David A. King  
Director of Shuttle Processing, NASA

**STS-103**  
**FLIGHT READINESS REVIEW**

**November 19, 1999**

**Back-Up Charts**

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**LOST ITEM PROBLEM REPORT****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99****Lost Items Not Found (7 Total)****Summary/Conclusion for all LAF PR's**

- A thorough search of each area was unsuccessful in finding/retrieving the lost items
- System Engineering evaluations have concluded no adverse effect on Orbiter system operations

**Forward**

- PR -LAF-3-27-0563: Unable to locate FCE cable post destow
- PR-LAF-3-27-0575: Unable to locate closeout cover
  - Weight: 212 grams
  - Size: 11" x 6"
- PR -LAF-3-27-0576: Pipin Knob missing on Fwd B hatch
  - Weight: 1.0 grams
  - Size: 0.62" x 0.20"

**LOST ITEM PROBLEM REPORT****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99****AFT**

- PR-LAF-3-27-0577: Engine 2 carrier panel missing fastener
  - Weight: 1.96 grams
  - Size: 0.60" x 0.30 x 0.25
  
- PR-LAF-3-27-0578: 50-1 door frame missing fastener
  - Weight: 10.17 grams
  - Size: 1.3" x 0.55 x 0.75
  
- PR-LAF-3-27-0579: 50-2 door frame missing fastener
  - Weight: 10.17 grams
  - Size: 1.3" x 0.55 x 0.75

**LOST ITEM PROBLEM REPORT****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99****POD**

- PR- LAF-LP01-30-0011: Nut plate came loose between TCS blanket and Y-web door
  - Weight: Less than 5 grams
  - Size: Less than 1" sq.
  - Location: L/H OMS Pod



# GROUND LAUNCH SEQUENCER

**Presenter:**

**Rich Millang**

**Organization/Date:**

**Ground Ops/11-19-99**

## Ground Launch Sequencer Configuration for STS-103

- GLSDD (KLO-82-0071A) Rev 7, Change S, September

1999  
LCC/

- OMRS

Description and Remarks

- Mask

ECL-40

FCL 1 & 2 Payload Heat Exchanger Flow Rate (FPV will be in the Interchanger position for Launch)

CT-01

TACAN 1 Range Built-in Status Word 2 Bit 4  
TACAN 1 Range Supression Pulse Present Word 2 Bit 7  
(TACANS 1&2 are Goulds, TACAN 3 is a Collins)

CT-01

TACAN 2 Range Built-in Status Word 2 Bit 4  
TACAN 2 Range Suppression Pulse Present Word 2 Bit 7  
(TACANS 1&2 are Goulds, TACAN 3 is a Collins)

**GROUND LAUNCH SEQUENCER****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99****LCC/  
OMRS****Description and Remarks**

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- Mask (Cont'd)

PAY-02

Payload Auxiliary RPC A - On  
Payload Auxiliary RPC B - On  
(No payload power required for launch)  
Sequences 01258-59

PAY-03

Payload Aft Main B Power - On  
Payload Aft Main C Power - On  
(No payload power required for launch)  
Sequences 01260-61

BREC-01

LH Voltage Mn Chute Disc Pic CAP  
RH Voltage Mn Chute Disc Pic CAP  
(LCC was deleted per PRCBD S72379VQ)

**GROUND LAUNCH SEQUENCER****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99****LCC/  
OMRS****Description and Remarks**

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- **Bypass**

None

Photo Camera Sequencer Start no longer required.  
Its replacement, the Photo Optical Control  
System does not require an LPS signal. Seq 175-01

None

Bypass the setting of the GCU 1 Sel ind  
Not required for 1203 GCUs. Sequences 29200-01

None

GCDKTIM4E - Timer #4. This timer was used to  
countdown the last 31 sec of the count.  
NTD's no longer require use of this timer.  
Sequence 247-11

## UNEXPLAINED ANOMALIES

**Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: ROMS Vapor Iso Valve Indicated OPEN When Commanded CLOSE (LV-506) (PR-UA-3-0150)
- Observations
  - During the OMS/RCS He system checkout LV-506 was commanded CLOSE using LPS, the indication showed OPEN
  - The valve was confirmed to be CLOSE by gas flow
  - A BITE TEST 4 verified the CLOSE command was sent and the OPEN command was OFF
- Actions Taken
  - The valve was cycled 10 times and all indications were nominal
  - A wiggle test was performed in accessible areas from the Pod I/F to the Avionics Bay 6 which did not recreate the anomaly
  - A review of SCAN found no history of connector demate

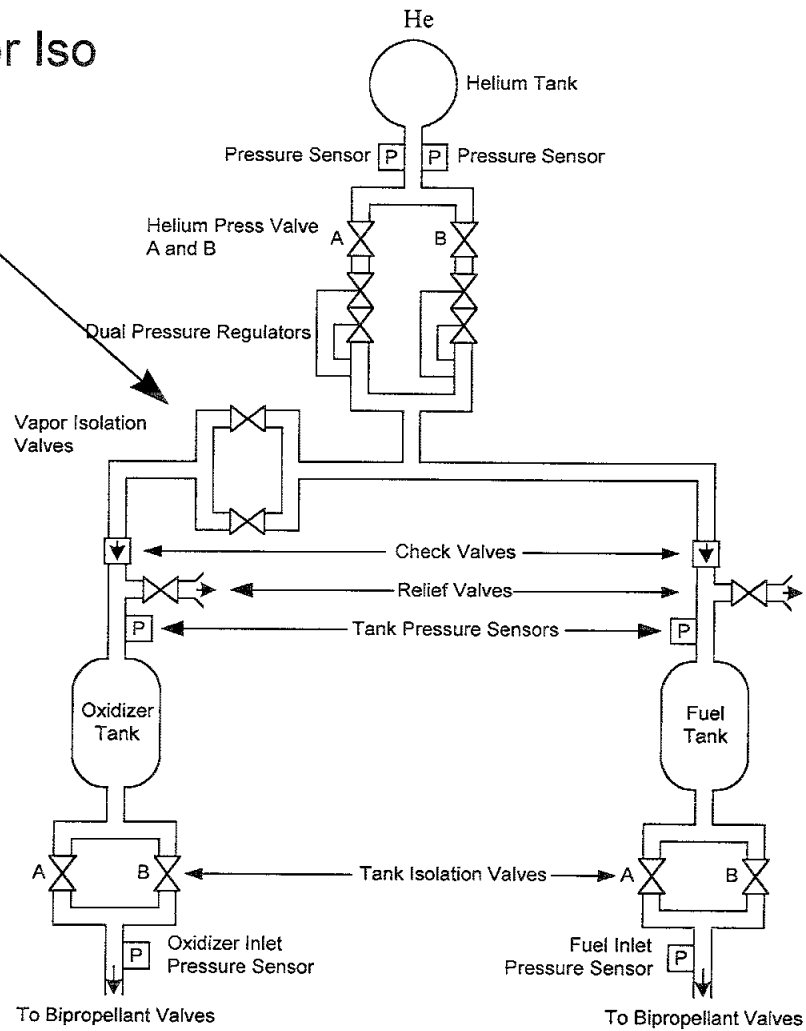
**UNEXPLAINED ANOMALIES****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: ROMS Vapor Iso Valve Indicated OPEN When Commanded CLOSE (LV-506) (PR-UA-3-0150)
  
- Prior Occurrence
  - During STS-70 processing a similar problem occurred when this valve was commanded CLOSE. The PR was deferred until OMM and only minor corrosion was found on adjacent pins
  - During ATP at the vendor a Vapor Isolation Valve did fail to indicate CLOSE (after 450 cycles). This was attributed to switch plunger being improperly adjusted, a design change has been made

**UNEXPLAINED ANOMALIES****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: ROMS Vapor Iso Valve Indicated OPEN When Commanded CLOSE (LV-506) (PR-UA-3-0150)
- Most probable Cause
  - Contamination on the Microswitch
- Risk Assessment
  - Low risk because of redundant flow path
- Flight Effect
  - None
    - The failure was indication only and the valve functioned correctly
    - If a false indication was to happen again, cycling the valve would most likely clear the indication
    - There is a redundant flow path through Vapor Isolation Valve LV-504

ROMS Vapor Iso  
Valve



GO-BU-11

**UNEXPLAINED ANOMALIES****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: LRCS He Iso Valve B Indicated OPEN When Commanded CLOSE (LV-201) (PR-UA-3-0151)
- Observations
  - During the OMS/RCS He system checkout LV-201 was commanded CLOSE using LPS, the indication never changed from OPEN to CLOSE
  - The valve position was not confirmed by gas flow
  - The Tandem Valve to LV-201 (LV-202) did CLOSE when the command was sent which verifies proper operation of AFT LCA 3 and PCA 3
- Actions Taken
  - The valve was cycled 30 times and all indications were nominal
  - A wiggle test was performed in accessible areas from the Pod I/F to the Avionics Bay 6 which did not recreate the anomaly
  - A review of SCAN found no history of connector demate

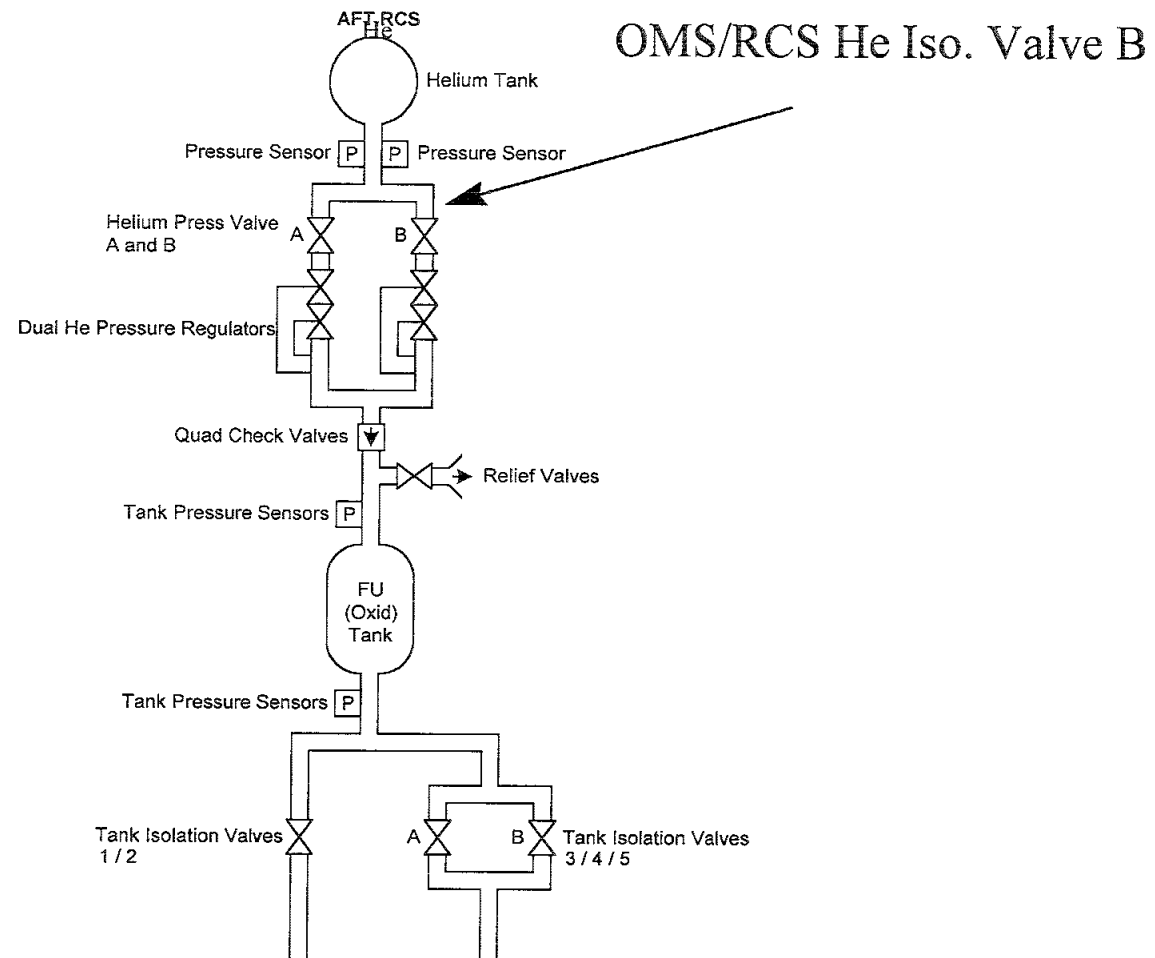


**UNEXPLAINED ANOMALIES****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: LRCS He Iso Valve B Indicated OPEN When Commanded CLOSE (LV-201) (PR-UA-3-0151)
- Prior Occurrence
  - There has been one prior occurrence of this event on STS-95 and that was also an unexplained anomaly (Ref. IPR-95V-0025)
    - The valve was confirmed to be closed by gas flow
- Most Probable Cause
  - Intermittent failure of the VPI Reed Switch

**UNEXPLAINED ANOMALIES****Presenter:****Rich Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: LRCS He Iso Valve B Indicated OPEN When Commanded CLOSE (LV-201) (PR-UA-3-0151)
- Risk Assessment
  - Low risk because of redundant flow path
- Flight Rationale
  - None
    - If a false indication was to happen again, cycling the valve would most likely clear the indication
    - There is a redundant flow path through Helium Isolation Valve LV-203



GO-BU-15

**UNEXPLAINED ANOMALIES****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: RPSF Noise Investigation
- Observation
  - July 1, 1999 at 2:45 p.m. in the afternoon, a loud bang was heard following the breakover of the BI099 left forward segment. The bang was heard shortly after handling ring contact with the railcar chocks occurred
- Concern
  - Structural integrity of cranes or flight segment

**UNEXPLAINED ANOMALIES****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: RPSF Noise Investigation (Cont'd)
- Discussion
  - Four events occurred in July:
    - July 1st set down of BI099 left fwd segment onto railcar a loud bang was heard just after lowering stopped
    - July 15th move of BI099 left fwd segment from west stand to east stand a low intensity boom was heard when the segment was approximately 3 feet from stand
    - July 23rd 100% load operational test with water bottle a low intensity boom was heard
    - July 31st during the inert segment break over a test a low intensity bang was heard

**UNEXPLAINED ANOMALIES****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: RPSF Noise Investigation (Cont'd)
- Discussion (Cont'd)
  - Inspections were performed on Railcar, Booster Segment, RPSF structure, GSE and all Crane Components
    - No anomalies found
  - Testing Completed:
    - 125% proofload completed on both cranes
    - 100% load operational test completed on both cranes (event July 23)
      - Operated bridge and trolley through available envelope for both cranes
    - Vertical Inert Segment testing
      - Operated bridge and trolley through available envelope for both cranes

**UNEXPLAINED ANOMALIES****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: RPSF Noise Investigation (Cont'd)
- Discussion (Cont'd)
  - Testing Completed (Cont'd)
    - Inert segment rotation - (event July 31)
      - Induced fleet angle
      - Duplicated operational events of July 1
  - Instrumentation was in use for two tests where events occurred:
    - July 23rd 100% load operational test event was recorded on accelerometers
    - July 31st inert segment breakover event was recorded on accelerometers, cameras and microphones
  - Fault tree was used as the primary analysis tool

**UNEXPLAINED ANOMALIES****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: RPSF Noise Investigation (Cont'd)
- Most Probable Cause
  - Most probable cause for the July 15th and 23rd noises:
    - The tendency for the 200-ton bridge cranes is to skew under asymmetrical loading conditions. Testing has indicated that the bridge drives on each end of these cranes are not synchronized and that one end may lead or lag the other end depending upon crane loading (trolley) position and wheel flange position relative to the runway rail. With relatively heavy loads, coupled with wheel flange position, momentary binding of the bridge can occur. The release of these forces can cause lateral movement of bridge wheels across the railhead resulting in significant noise levels



**UNEXPLAINED ANOMALIES****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: RPSF Noise Investigation (Cont'd)
- Most Probable Cause (Cont'd)
  - Most probable cause for the July 1st and 31st noises:
    - The north west wheel of crane # 1 moved south across the railhead due to forces induced by a significant fleet angle to the horizontal segment, wheel flange position, and the unsynchronized bridge drives
    - The original event was duplicated as close as possible on July 31st with the inert segment. As the segment was supported horizontally between the 200-ton cranes, a fleet angle of approximately three degrees was achieved by moving crane # 2 east. When both cranes were commanded to bridge east, the flange of the north east wheel of crane # 1 was binding against the north runway. This restricted movement of the north side of the crane # 1 bridge

**UNEXPLAINED ANOMALIES****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: RPSF Noise Investigation (Cont'd)
- Most Probable Cause (Cont'd)
  - Most probable cause for the July 1st and 31st noises (Cont'd)
    - The south side of the crane started to move as the bridge drives were commanded east. This caused the crane to start to pivot about the binding north east wheel with the north west wheel slipping across the railhead causing considerable noise. The fleet angle between the crane and load added a significant horizontal force component that added to skewing motion and resultant motion of the north west wheel
    - Supported by accelerometer data and video/audio recordings

**UNEXPLAINED ANOMALIES****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: RPSF Noise Investigation (Cont'd)
  
- Risk Analysis - Green
  - The skewing and slipping of the bridge wheels horizontally across the railhead does not have any adverse structural concerns with the integrity of the cranes
  - Does not impart a measurable load on the flight booster segment
  - RPSF cranes have been released for normal operation

**UNEXPLAINED ANOMALIES****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: RPSF Noise Investigation (Cont'd)
- Follow on actions to help reduce the probability of a re-occurrence
  - Long Term
    - Implement ESR K13603 to synchronize the crane drive system
    - Evaluate long term data recording system on cranes to define an "in-family" event
    - Items will be tracked via USA SOAG 99-055

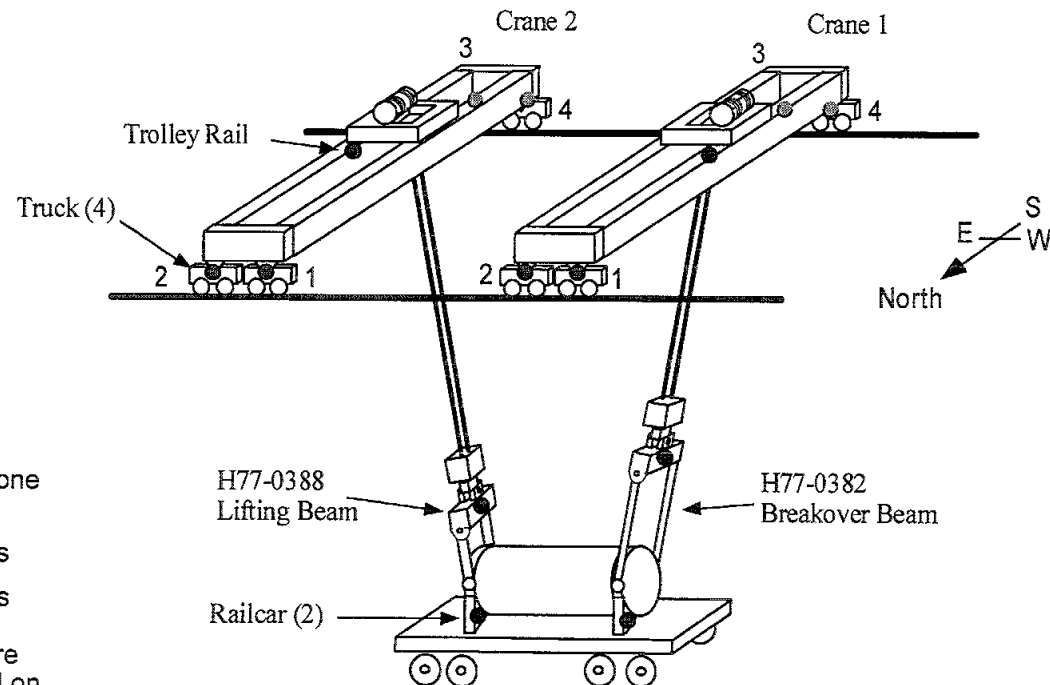
**UNEXPLAINED ANOMALY -  
RSPF NOISE INVESTIGATION  
(JULY 1ST TEST INSTRUMENTATION SET UP)**

**Presenter:**

**R. Millang**

**Organization/Date:**

**Ground Ops/11-19-99**

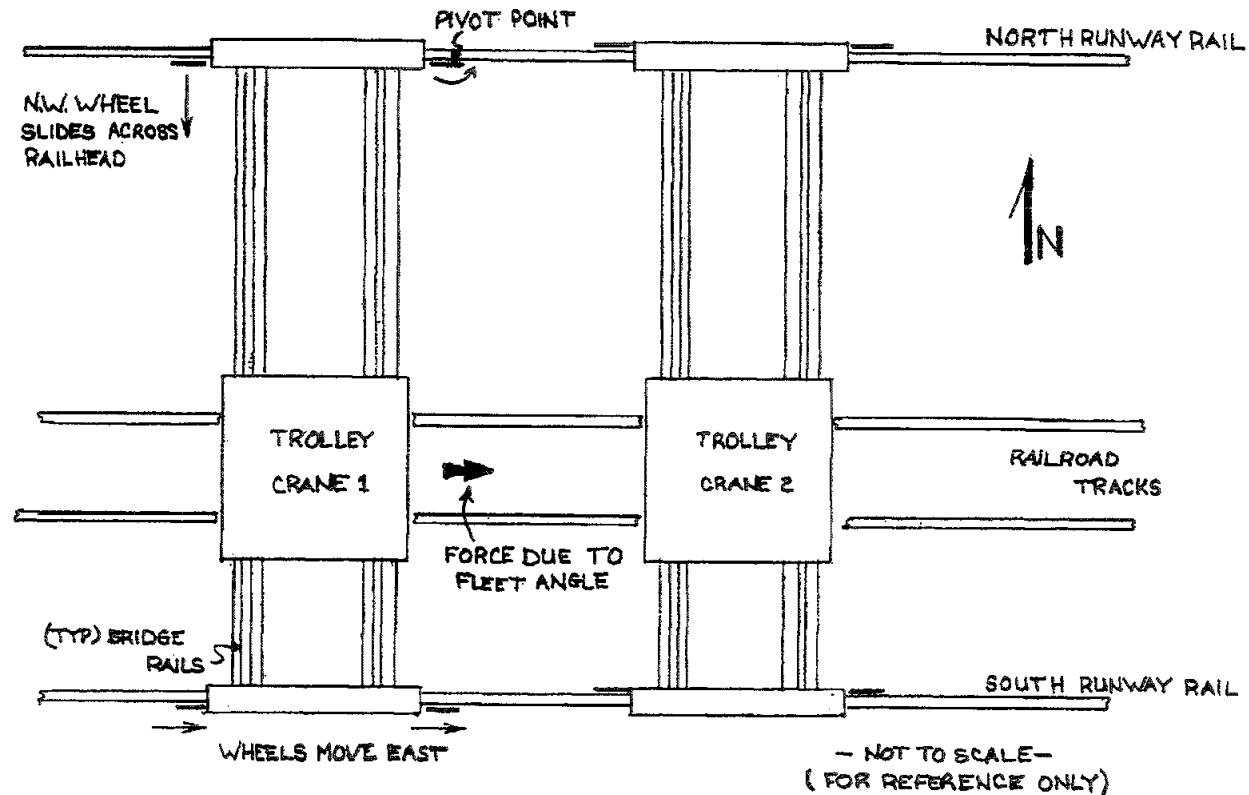


- 1-4 = Camera and microphone locations(both cranes)
- O = accelerometer locations
- Not shown: Accelerometers located on building "skin". Additional microphones were installed on the catwalk and on the RPSF floor.

**UNEXPLAINED ANOMALY -  
RPSF NOISE INVESTIGATION  
(NORTH WEST WHEEL SLIDE ON CRANE 1)**

**Presenter:**  
R. Millang

**Organization/Date:**  
Ground Ops/11-19-99



**ENGINEERING TOPIC****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: ET/SRB Blind Closeouts With Possibility of Cable Damage
- Forward Separation Bolt Ordnance
  - The ordnance inside the SRB forward skirt to the forward separation bolt is a blind installation behind a cover (door)
- Control of Risk
  - The cable is routed through the panel door. A hangar has been designed to safely hang the door during ET mate and ensuing separation bolt installation. The edges of the panel are visible. In the event that a cable is being pinched, the flat panel should not seat in a flush manner. The connection is tested as part of B5304-T29A, and in S0008 STS All Systems Test. Hardware change out can be done inside the forward skirt

<b>ENGINEERING TOPIC</b>	<b>Presenter:</b>
	<b>R. Millang</b>
	<b>Organization/Date:</b> <b>Ground Ops/11-19-99</b>

- Title: ET/SRB Blind Closeouts With Possibility of Cable Damage (Cont'd)
- Hold Down Stud and Lower Nut Installation
  - During installation of the stud into the booster and hold-down post, and the subsequent installation of the lower washer and nut, blind installation can (and has) caused damage to the strain gage wires on the stud
- Control of Risk
  - Strain gage cables are tested immediately after installation and before tensioning. The strain gages are also monitored many times during the flow. Changeout can be done as last as S0007



<b>ENGINEERING TOPIC</b>	<b>Presenter:</b>
	<b>R. Millang</b>
	<b>Organization/Date:</b> <b>Ground Ops/11-19-99</b>

- Title: ET/SRB Blind Closeouts With Possibility of Cable Damage (Cont'd)
- Strut Covers
  - Strut covers include the "milk cans" on the upper strut and the firing line covers on the lower and diagonal struts. All are blind installations over wiring
- Control of Risk
  - The "milk cans" are lightweight covers installed over restrained and relatively heavy jacketed cable. The cables would deform the cover before damaging the cables. The firing line covers could pinch or damage the firing lines during the installation process. This is a well-known problem and technicians are well-trained and the procedure well documented (including cautions) for this installation. The system is checked before orbiter mate, and all struts can be changed out in place in the VAB

**ENGINEERING TOPIC****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: ET/SRB Blind Closeouts With Possibility of Cable Damage (Cont'd)
- Frangible Nut PIC Cables Under HDP Blast Shields
  - The blast shields are installed over PIC cables routed out of the hold-down posts. The cables are secured in place with tape, but the installation is blind due to the size and handling of the blast shield
- Control of Risk
  - The PIC cables are taped down prior to blast shield installation and are not free to move. The cables are checked before ET mate. Changeout can happen as late as S0007 and can be done in the VAB or at the pad

**ENGINEERING TOPIC****Presenter:****R. Millang****Organization/Date:****Ground Ops/11-19-99**

- Title: ET/SRB Blind Closeouts With Possibility of Cable Damage (Cont'd)
- ET Intertank Cables
  - LH2 Ullage Pressure and LH2 FWD liquid level and LH2 Ullage Temp and pressure cables are mounted on the FWD dome of the LH2 tank. Personnel within the Intertank area present a potential to step upon and thereby crush the cabling associated with these functions
- Control of Risk
  - The access kit is installed whenever access is required to the intertank area and provides protection to these cables

<b>ENGINEERING TOPIC</b>	<b>Presenter:</b> <b>R. Millang</b>
	<b>Organization/Date:</b> <b>Ground Ops/11-19-99</b>

- Title: ET/SRB Blind Closeouts With Possibility of Cable Damage (Cont'd)
- Forward Dome Cables
  - The cables associated with the igniter heater, igniter firing lines and OPT's are routed on the surface of the forward dome. The cables could be damaged (Crushed) by workers stepping on the cables
- Control of Risk
  - An GSE igniter cover protects the igniter and OPTs and part of their cabling from damage. The forward skirt access kit protects the remaining dome cables from damage. The access kit itself was shown to present a pinch hazard to the cables and subsequently the access kit was modified to eliminate this potential

# GSE Cable & Wiring Condition Summary

SYSTEMS	Launch	GSE	Communications Systems					Standalone/
	Processing	Launch	Network	Voice	Cable	Facility	Landing	Portable
SITES	System	Support	System	System	Plant	Systems	Systems	GSE
LC39 Area Wide	(G)	(G)	(G)	(G)	Lead Sheath (Y)	60 HZ Pwr (Y)	N/A	N/A
LCC	(G)	(G)	(G)	(G)	MDF-51 (Y)	60 HZ Pwr (Y)	N/A	(G)
PADs	(G)	Payloads (Y)	(G)	(G)	(G)	60 HZ Pwr (Y)	N/A	(G)
MLPs	(G)	(G)	(G)	(G)	(G)	60 HZ Pwr (Y)	N/A	(G)
OPFs	(G)	(G)	(G)	(G)	(G)	60 HZ Pwr (Y)	N/A	(G)
VAB	(G)	(G)	(G)	(G)	(G)	(G)	N/A	(G)
SSMEPF	N/A	(G)	(G)	(G)	(G)	N/A	N/A	(G)
HMF	(G)	(G)	(G)	(G)	(G)	60 HZ Pwr (Y)	N/A	(G)
Transporters	N/A	(G)	(G)	(G)	(G)	(G)	N/A	N/A
SLF - KSC	N/A	(G)	(G)	(G)	(G)	N/A	(G)	N/A
SLS - DRFS, WSSH	N/A	(G)	(G)	(G)	(G)	N/A	(Y)	N/A
Overseas Landing Sites	N/A	N/A	(G)	(G)	(G)	N/A	(G)	N/A
VABR	N/A	N/A	(G)	(G)	(G)	60 HZ Pwr (Y)	N/A	N/A
CD&SC	N/A	N/A	N/A	(G)	(G)	60 HZ Pwr (Y)	N/A	N/A
GREEN (G)		Fully Supports Processing						
YELLOW (Y)		Supports Processing - Corrective Action Required (2-5 yrs)						
RED (R)		Non Support of Processing - Corrective Action Required (Immediate Flow Impact)						

## LAUNCH TEAM TRAINING

**Presenter:****Dave King****Organization/Date:****Launch & Landing/11-19-99**

- Major Training Activities Accomplished
  - Three Launch Countdown Simulations - 6 runs total
    - Simulating short window environment
    - Expanded to include MCCH and HOSC participation
  - Contingency Training
    - Pad Egress Mode 4 Simulation
    - Landing Team Mode 7 Tabletop Simulation
  - Terminal Count Demonstration Test
    - JSC participation
- Planned Activities
  - MMT Prelaunch Simulation
  - S0056 ET Cryogenic Load Simulation
- Ready for STS-103 Launch and Landing

